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thoroughly suited to the audience addressed. While the subject is treated entirely from the side of mammalian physiology as a basis of comparison, the book bears much of interest to plant physiologists. The limited power of mammals to manufacture amino acids, especially lysine and tryptophan, the inadequacy of certain plant proteins (zein and gliadin) as a nitrogen source for mammals because of the absence of one or both of these amino acids, and the idea that amino acids play a specific rôle in metabolism and perhaps growth, aside from their use as source of energy and building material, are all suggestive to the plant physiologist, and contrast with the situation more generally met by him.—WM. CROCKER.

A new manual.—PIPER and BEATTIE⁸ have published a manual of the flora of the region described as "lying between the summit of the Cascade Mountains and the Pacific Ocean from the 49th parallel of latitude across the southern portion of Vancouver Island, south to the headwaters of the Willamette River." There are four life zones represented: humid transition zone, including the great forests of Douglas spruce; Canadian zone, not sharply limited; Hudsonian zone, indicated by subalpine fir, Alaska cedar, black hemlock, and white-bark pine; and arctic zone, consisting of the alpine flora above timber line. It is a most interesting floral region, not hitherto represented in a suitable manual. The material upon which the work is based is mainly to be found in the herbarium of the State College of Washington.

The usefulness of a manual can be judged only by its use; but so far as organization and appearance go, this manual promises to be all that can be desired. The size of the volume indicates a rich and varied flora, and the summary states that 1617 species and subspecies are presented, representing 550 genera and 100 families. New species are described in *Arctostaphylos*, *Godetia*, *Panicularia*, *Populus*, and *Solidago* (2), and 14 new combinations are proposed. A useful glossary and a full index complete the volume.—J. M. C.

Botanical technique.—The second volume of the *Praktikum* of MÖBIUS⁹ deals with thallophytes, bryophytes, pteridophytes, and gymnosperms. The descriptions and directions are in general good, but the quality of the illustrations is very variable. Some are excellent, others are so faithfully drawn that the carelessness of the technician is very apparent, as shown by the figure of a cross-section of the stem of *Lycopodium complanatum*. A figure of a young antheridium of *Pellia epiphylla* shows that the illustrator did not know he was drawing from an oblique section. In any text, especially one intended for beginners, accuracy and clearness of statement should be paramount. In addition to an intimate knowledge of the subject, an author should also be

⁸ PIPER, CHARLES V., and BEATTIE, R. KENT, *Flora of the northwest coast*. 8vo. pp. xiii+418. Lancaster (Pa.): The New Era Printing Co. 1915. \$1.75.

⁹ MÖBIUS, M., *Mikroskopisches Praktikum für systematische Botanik* (II). 8vo. pp. v+314. figs. 123. Berlin: Gebrüder Borntraeger. 1915.

able to interpret a section correctly and to know when there is a glaring fault in his technique.—W. J. G. LAND.

Illustrations.—A series of lectures dealing with the illustration of botanical papers was delivered at the University College, London, in 1913, by T. G. HILL. In response to various requests, these lectures are now published in book form.¹⁰ The various forms of intaglio, plane surface, and relief printing are described, and their limitations noted. Suggestions are given for the preparation of copy suited to the various types of reproduction. The descriptions of processes are interesting, and, combined with the practical hints, should enable investigators to furnish more effective copy. There is no effort to give instruction in drawing.—C. J. CHAMBERLAIN.

North American Flora.—The third part of Vol. 17 continues the presentation of the Poaceae, and includes the genus *Panicum* by HITCHCOCK,¹¹ who recognizes 211 species distributed among 46 tribes. No new species are described, but it is interesting to note that HITCHCOCK's name is associated with 32 of the species. Other diligent students of the species have been NASH (30 species), SCRIBNER (25 species), and ASHE (16 species).—J. M. C.

NOTES FOR STUDENTS

Anthocyanins.—WILLSTÄTTER¹² and his students have made an extensive study of the anthocyanins of various flowers and fruits. The findings are certain to prove of great importance to plant workers, especially breeders and physiologists. The work puts this previously little understood group of plant pigments among those most thoroughly worked. All such matters as methods of extraction, purification, and quantitative estimation, general chemical constitution, general chemical characters, empirical and structural formulae, and

¹⁰ HILL, T. G., The essentials of illustration. 8vo. pp. xii+95. London: Wesley & Son. 1915.

¹¹ North American Flora 17:part 3. pp. 197-288. Poales: Poaceae (pars), by G. V. NASH and A. S. HITCHCOCK. New York Botanical Garden. 1915.

¹² WILLSTÄTTER, R., Über Pflanzenfarbstoffe. Ber. Chem. Gesells. 47:2831-2874. 1915; WILLSTÄTTER, R., and NOLAN, T. J., II. Über den Farbstoff der Rose. Ann. Chem. 408:1-14. 1914; WILLSTÄTTER, R., and MALLISON, H., III. Über den Farbstoff der Preiselbeere, *ibid.* 15-41; WILLSTÄTTER, R., and BOLTON, K., IV. Über den Farbstoff der Scharlachpelargonie, *ibid.* 42-61; WILLSTÄTTER, R., and MIEG, W., V. Über ein Anthocyan des Rittersporns, *ibid.* 61-82; WILLSTÄTTER, R., and ZOLLINGER, E. H., VI. Über die Farbstoffe des Weintraube und der Heidelbeere, *ibid.* 83-109; WILLSTÄTTER, R., and MARTIN, K., VII. Über den Farbstoff der *Althaea rosea*, *ibid.* 110-112; WILLSTÄTTER, R., and MIEG, W., VIII. Über den Farbstoff die wilder Malve, *ibid.* 122-135; WILLSTÄTTER, R., and NOLAN, T. J., IX. Über den Farbstoff die Päonie, *ibid.* 136-146; WILLSTÄTTER, R., and MALLISON, H., X. Über Variationen der Blütenfarben, *ibid.* 147.